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(54) Title of the Device: INTEGRATED CIRCUIT MOUNTING STRUCTURE OF LIQUID CRYSTAL DISPLAY PANEL

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Specification

1. Title of the Device

Integrated Circuit Mounting Structure of Liquid Crystal Display Panel

2. Scope of Claim for Utility Model Registration

(1) An integrated circuit (hereinafter abbreviated to IC) mounting structure of a liquid crystal display panel for allowing an IC to conduct electricity at a lead electrode portion of a liquid crystal display panel by using a conductive or anisotropic adhesive agent or using solder as a conductor in a face-down way, characterized in that the IC is mounted to the liquid crystal display panel in such a way that an insulating high-polymer material is adhered so as to cover the lead electrode portion of the liquid crystal display panel, an opening is formed at the lead electrode portion opposed to an electrode pad portion of the IC, the opening portion is filled with a conductor such as a conductive adhesive agent or solder paste, the opposed electrode pads of the IC are adjusted in a face-down way, and heat and pressure are applied thereto to cure or reflow the conductor.

(2) The IC mounting structure of a liquid crystal display panel according to claim (1) for Utility Model Registration, characterized in that a bump such as gold is provided to the electrode pad of the IC and a height of a convexity of the bump is lower than a thickness of the high-polymer material.

3. Detailed Description of the Device

[Industrial Field]

This device relates to a structure in which an IC for supplying display signals to a liquid crystal display panel is mounted on the liquid crystal display panel.

[Brief Summary of the Invention]

According to this device, in the structure where an IC is mounted in a

face-down way via a conductive material on a metal wiring pattern provided on a glass substrate of a liquid crystal display panel, a bump mask film having an opening in a bump portion of the IC is fixed to the glass substrate so that the opening portion of the bump mask film is filled with the conductive material such as a conductive adhesive agent, thereby jointing the bump portion of the IC with the metal wiring pattern of the glass substrate electrically and mechanically.

[Prior Art]

Conventionally, a display signal IC of a liquid crystal display panel has been mounted on a copper foil wired on a high-polymer material, and signals have been supplied electrically as the display signals by, after forming a silver foil pattern on a flexible high-polymer material, soldering or a conductive adhesive agent to a lead electrode portion of a liquid crystal display panel. According to this method, the pitch of display pixels cannot be narrowed. For this reason, in recent years, the display signal IC has been mounted on the glass of the liquid crystal display panel. In FIG. 2, which shows an example of mounting that is conducted recently, a solderable lead electrode 7 is provided to a glass substrate 8. Next, a solder bump IC 5′ is opposed to the lead electrode 7 and reflowed. Then, solder 10 of the solder bump is jointed with the lead electrode 7. After that, a frame 6 is formed with a high-polymer material outside the solder bump IC 5′, and then a mold agent 4 is applied to coat the solder bump IC 5′. Thus, the display signal IC is mounted. It is to be noted that 2′ in FIG. 2 is a copper bump to form the solder bump.

[Problem to be Solved by the Device]

However, according to the conventional method, the cost of the IC increases because the solder bump IC 5′ is used in the display signal IC. Further, since several to ten-odd solder bumps ICs 5′ are mounted to one liquid crystal display panel, the solder bump IC 5′ needs to be replaced due to the decrease in the mount yield. In this case, after removing the solder bump IC 5′, it is difficult to mount a new solder bump IC

5′. Further, since the lead electrode 7 is formed with a metal capable of solder bump to the liquid crystal display panel for the soldering, the cost of the liquid crystal display panel increases. Consequently, the present device is made to solve such defects.

[Means for Solving the Problem]

To solve the problem, the present device does not use the solder bump IC 5′ but can use a bump which is convex compared with the surface of the IC, such as a gold bump IC 5 or a nickel bump IC. That is to say, a bump mask film 3 having a larger opening than the gold bump 2 is provided at the lead electrode 7 portion of the liquid crystal display panel, the opening portion of the bump mask film 3 is filled with a conductive adhesive agent 1, and the gold bump IC 5 is set in a face-down way so that electric connection is obtained with the lead electrode 7 by the conductive adhesive agent 1.

[Operation]

With the above structure, the lead electrode 7 can be formed with a transparent conductive film without particularly providing the lead electrode 7 of metal on the glass substrate 8. A gold bump, copper metalized with nickel, or a nickel bump can be used as the bump of the IC. When a thermoplastic material is used for the conductive adhesive agent 1, the IC can be replaced easily.

[Embodiment]

The embodiment of the present device is hereinafter described based on the drawings. FIG. 1(a) is a schematic view showing a plane of the present device. FIG. 1(b) is a schematic view showing a cross section taken along X-X′ of FIG. 1(a). In FIG. 1(b), a bump mask film 3 is laminated on a glass substrate 8, and an opening is formed to the bump mask film 3 by a photo resist method. The bump mask film 3 is formed with a negative photo resist that is a heat-resistant material. Next, after filling the bump mask film 3 having the opening with a conductive adhesive agent 1 by a printing

method, the upper side of the bump mask film 3 is squeegeed in the same way as a screen printing method, thereby removing the excess conductive adhesive agent 1 on the bump mask film 3. Next, a gold bump IC 5 is set as shown in FIG. 1 (b), and the heat of 130 to 170°C by pulse heat and the pressure of 5 to 50 kg/cm^2 are applied for several to ten-odd seconds from the back side of the gold bump IC 5 so as to cure the conductive adhesive agent 1. Then, after an operation test, a frame 6 is formed with a silicon resin by printing at a circumference of an IC and the IC is coated with a mold agent 4; thus, the display signal IC is mounted on the glass substrate 8. The present embodiment is conducted using the gold bump IC 5; however, the material of the bump in this structure only needs to have electrical conductivity. Therefore, copper, nickel, or the like can be used widely. Further, since the bump mask film 3 is used, there is an effect that the alignment of the gold bump IC 5 can be conducted easily.

[Effect of the Device]

As thus described, since the lead electrode and the pad of the IC are connected electrically by the conductive adhesive agent, the cost of the IC decreases and the IC can be replaced easily. Moreover, the thick metal pattern is not necessary for the lead electrode of the liquid crystal display panel, and it is possible to provide an inexpensive IC mounting structure.

4. Brief Description of the Drawings

FIG. 1(a) is a schematic view showing a plane of this device, comprising an upper glass substrate 9 and a glass substrate 8 where an IC is to be mounted which constitute a liquid crystal display panel. FIG. 1(b) is a schematic view showing a cross section taken along X-X′ of FIG. 1(a).

FIG. 2 is a cross-sectional view showing a conventional structure.

1...conductive adhesive agent

2...gold bump

2′...copper bump

3...bump mask film

4...mold agent

5...gold bump IC

5′ ...solder bump IC

6...frame

7...lead electrode

8...glass substrate

9...upper glass substrate

10...solder

CONCLUDED

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